

# SOME OBSERVATIONS ON *PINUS GLABRA* WALTER (PINACEAE)

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## ABSTRACT

*Pinus glabra* Walter is the least common of the southeastern pines. It rarely if ever grows in pure stands. Quadrats were established at 14 sites in the southeastern United States wherever *P. glabra* was abundant throughout its range. Importance values of trees found in sample plots indicate that *P. glabra* had a higher importance value in Mississippi than had been previously reported.

## INTRODUCTION

*Pinus glabra* Walter, spruce pine, the least common of the southeastern pines, rarely if ever grows in pure stands. It occupies soils that are loamy, low in organic content, and acid in reaction. *Pinus glabra* may be found in all stages of its life history in mature forests within its range, an unusual occurrence for a pine. Its seedlings and saplings have been reported growing where light intensity was as low as 250 foot candles (Dial et al. 1976).

Dial et al. (1976) have studied *P. glabra* on sites in the lower coastal plain of South Carolina where *P. glabra* is locally abundant. They sampled six areas in Colleton and Dorchester counties, South Carolina and found *P. glabra* to be associated with *Liquidambar styraciflua*, *Pinus taeda*, and *Quercus virginiana*.

Harrar (1964) reported that *P. glabra* reaches its maximum development within an area in northwest Florida between the Choctawhatchee and Chattahoochee rivers. Observations by the present authors in this area indicate that *Pinus clausa*, sand pine, not *P. glabra*, occurred in pure stands in this area. The objective of the present study was to determine the relative abundance of *P. glabra* within its range in the southeastern United States.

## METHODS

To determine the relative abundance of *P. glabra* within portions of its range in the southeastern United States, vegetation was sampled by the quadrat method at 14 stations. Six areas in Dorchester and Colleton coun-

ties, South Carolina had been sampled and reported previously by the present researchers in an earlier paper (Dial et al. 1976). Eight additional sites in Georgia, Florida, Mississippi, Alabama and Louisiana were selected to sample vegetation in the area of maximum development of *P. glabra*. Site 2 was selected in Seminole County, Georgia; Site 3 in Jackson County, Florida; Site 4 in Gadsden County, Florida; Site 5 in Washington County, Florida; Site 6 in Okaloosa County, Florida; Site 7 in Pearl River County, Mississippi; Site 8 in Geneva County, Alabama; and Site 9 in Washington Parish, Louisiana. In each of the aforementioned areas, twenty 10 x 10 m quadrats were selected to sample the arborescent vegetation. Importance values of the arborescent species were calculated by the following formula: Importance Value = the sum of the relative density, relative frequency and relative dominance (percent basal area). Nomenclature follows that of Radford et al. (1968).

A smaller 2 m by 4 m plot located near the center of the larger plot was used to sample seedlings and saplings. A 1 m<sup>2</sup> plot located near the center of the 2 m by 4 m plot was used to sample herbs and grasses.

Sample plots were randomly selected within the specific areas sampled; no two plots were ever adjacent to each other. The fact that the sampling was not random must be emphasized; the locations for the 14 sample areas were chosen with discrimination for the purpose of sampling *P. glabra* in areas of high density.

#### RESULTS & DISCUSSION

*Pinus glabra* reached its best development in a stand located in Pearl County, Mississippi, just east of the Pearl River. Here *P. glabra* attained an importance value of 157, while *Carpinus caroliniana*, the most important associate attained an importance value of 58 (Table 1). If *Carpinus*, an understory tree, were not included in the importance value calculations, *P. glabra* would have had an even higher importance value. The average importance value of *P. glabra* on the Florida sites was slightly higher (78.5) than the importance values for *P. glabra* on the South Carolina sites where the average importance value was 69. Importance values for *P. glabra* were higher in Mississippi and Georgia, but represent data from single study sites sampled by 20 quadrats. In Florida, *P. glabra* attained an importance value of 127 at the Okaloosa site, which was located west of the Choctawhatchee River.

*Pinus glabra* was usually associated with *Liquidambar styraciflua* and *Pinus taeda* in South Carolina. *Carpinus caroliniana*, *Quercus virginiana* and *Carya glabra* might also be associated with *P. glabra* in South Carolina but generally were not as common as *Liquidambar* and *P. taeda*. In Florida, *Q.*

TABLE 1. Importance values of tree species associated with *Pinus glabra* at nine study sites in the southeastern United States. Site 1, South Carolina; Site 2, Georgia; Sites 3-6, Florida; Site 7, Mississippi; Site 8, Alabama; Site 9, Louisiana. See the methods section for site location.

SPECIES	IMPORTANCE VALUES FOR 9 STUDY SITES								
	1	2	3	4	5	6	7	8	9
<i>Pinus glabra</i>	69	130	43	53	91	127	157	45	118
<i>Quercus nigra</i>	15	59	5	42	17			21	
<i>Pinus taeda</i>	35				22	11	4		
<i>Liquidambar styraciflua</i>	38	13		31	16	22	26	7	19
<i>Ilex opaca</i>	9			7	4			13	
<i>Acer rubrum</i>	17	7		13			3	6	13
<i>Salix nigra</i>	2					3			
<i>Carya glabra</i>	20					3			
<i>Quercus virginiana</i>	26		22	48	75	25		74	
<i>Fagus grandifolia</i>	6		54	34					55
<i>Carpinus caroliniana</i>	15			13	9	20	58	31	11
<i>Persea palustris</i>	1								
<i>Cornus florida</i>	1								
<i>Nyssa biflora</i>	8			4	5	6	31	29	19
<i>Quercus michauxii</i>	10			3					9
<i>Ulmus alata</i>	8								
<i>Fraxinus americana</i>	3								
<i>Quercus laurifolia</i>	6		17		32	82		51	13
<i>Quercus stellata</i>	3				3				
<i>Ostrya virginiana</i>	3					3			
<i>Quercus alba</i>	4		5						
<i>Pinus elliotii</i>		76	13	15					
<i>Ulmus americana</i>		5	5						5
<i>Carya spp.</i>		3		20					
<i>Magnolia grandiflora</i>			130	23	8			10	
<i>Quercus falcata</i>		14	6						
<i>Carya aquatica</i>				9			6	12	6
<i>Taxodium distichum</i>				4	5		3		7
<i>Fraxinus caroliniana</i>							3		
<i>Berula nigra</i>							3		20
<i>Prunus sp.</i>								5	

*virginiana* was the usual associate of *P. glabra*, while *Quercus nigra*, *Liquidambar*, *Carpinus*, *Nyssa biflora*, *Magnolia grandiflora* and *Quercus laurifolia* were less frequently associated with the species (Table 1). Generally, the aforementioned trees were commonly found with *Pinus glabra* in the southeastern United States. Additional trees associated with *P. glabra* included *Acer rubrum*, *Pinus elliotii*, *Carya aquatica*, and *Taxodium distichum*, yet none of these trees with the exception of *P. elliotii* attained high importance values in the sites sampled in the present study.

*Pinus glabra* often forms a part of the understory and occasionally the overstory in mixed hardwood pine forests in the lower coastal plain of the

southeastern United States. *Pinus glabra* has the capacity for survival in deep shade and specimens of all sizes and ages from seedlings to mature seed trees, thrive in deep shade. Green (1938) calls *P. glabra* the most shade tolerant of the eastern pines.

*Pinus glabra* was conspicuously present in all stages of its life history, and was one of the most commonly encountered seedlings and saplings in the study plots. Other seedlings and saplings associated with *P. glabra*, listed in decreasing order of density include: *Liquidambar styraciflua*, *Quercus nigra*, *Acer rubrum*, *Carya glabra*, *Ilex opaca*, *Persea palustris*, and *Carpinus caroliniana*. Others with lower density were also present.

Shrubs and lianas were represented by *Rubus* spp., *Myrica cerifera*, *Sebastiania ligustrina*, *Sabal minor*, *Vaccinium* spp., *Aralia spinosa*, *Smilax* spp., *Rhus radicans*, *Gelsemium sempervirens*, *Lonicera japonica*, *Vitis rotundifolia*, *Parthenocissus quinquefolia*, *Campsis radicans*, *Bignonia capreolata*, and many others. Common grasses and herbs included *Arundinaria tecta*, *Panicum* spp., *Uniola laxa*, *Elephantopus tomentosus*, *Scleria* spp., and others. *Polypodium polypodioides* was usually present on the limbs of large live oaks, if *Quercus virginiana* occupied the study sites.

Harrar (1964) reported that *Pinus glabra* rarely, if ever, grows in so called pure stands "with the exception of an area in northwest Florida between the Choctawhatchee and Chattahoochee rivers where it reaches its maximum development." Data in the present study indicate that the development of *P. glabra* in northwestern Florida was no more pronounced than in other areas sampled. In fact, development was not as great in northwestern Florida as in Pearl River County, Mississippi or Washington Parish, Louisiana (Table 1). No pure stands of *P. glabra* were observed in this work in northwestern Florida as reported by Harrar (1964) although sand pine, *Pinus clausa* was observed in nearly pure stands on higher drier sites in this area.

#### REFERENCES

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